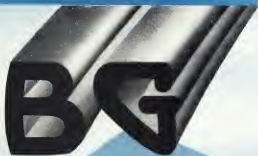


# AVIATION WEEK

A MCGRAW-HILL PUBLICATION

January 23, 1950



## *34th year of service to world aviation*

1950 ushers in the 34th year of continuous, specialized service by **BG** to the Aviation Industry of the World. During this period there have been unceasing development and improvement of **BG** spark plugs and accessories to match the needs of a growing and changing industry. This rich background of experience is the foundation of the reputation for dependability enjoyed by **BG** products throughout the World.

FOR AIRCRAFT ENGINES . . . AIRCRAFT SPARK PLUGS

**THE BG CORPORATION**

NEW YORK 19, N. Y.



BG Spark Plug  
for jets.

BG Spark Plug  
for reciprocating  
engines.



*Your name*  
*the Engine*

## **Titeflex**

has the correct  
**Ignition Shielding**



During the war, TITFLEX made ignition shielding for practically every type of compressing engine used on military and civilian aircraft. Today there is scarcely an airline in the United States and Canada that does not use TITFLEX ignition shielding on at least a part of their equipment.

**Titeflex, Inc.**

Add'l Publications: *See* Smith's D. H. J.

**Exclusive Manufacturers of Teflon high  
pressure cookers for more than 30 years**

**Web Online** 11-04-08 17:11:40 10.101.10.101

## Aviation Week

Volume 52

January 23, 1960

Number 4

## Headline News

First Location Flight Opened .....	12
Top Arnold Dies .....	14
CAA Withdraws Stage Line Support ..	15
Watson Sets Miami Record .....	17

## Aeronautical Engineering

First Details on Bambi's H-11	24
Phyllis' Research Accelerated	24

## References

Cheaper Way to Turn Jet Plans . . . 33

**Fluoride**

John Henry Stone, Esq. Comstock 25

### Air Treatment

Smoker Delivering Tokes Weighed	43
Sept-For-Debtors Showing Up	44

### Aviation Sales & Service

Dyke Shores 1000 Photos [View all photos](#) 16

### New Aviation Products

Cross-Product Effects of Windows ..... 19

## Departments

Newslines	1
Arbitration Calendar	2
Newslines	3
Industry Observer	10
Who's Who	10
Engineering Forum	10

As Fire Castles	37
Shortlines	40
CAR Schedule	50
Neatly Packed	52
What's New	53
Letters	54

Markus H. Wenzel

**Keywords:** child sexual abuse; disclosure; legal system

Maxwell W. Meckel, M.D., FRCPC, is a professor of medicine and a senior advisor to the chief of staff at the University of Toronto. He is also a senior advisor to the chief of staff at the University of Toronto.

William Kruger	Assistant Managing Editor	Stanley L. Collier	Assistant Vice Editor
Erving Stone	Technical Editor	Marie Adams	Editorial Assistant
Alexander McDuffee	Executive Editor	Joel H. Kroszky	Editorial Assistant
Charles L. Adams	Managing Editor	Vernice Gussell	Editorial Assistant
Robert McManus	Typography	Karen J. Sullivan	Editorial Assistant
Henry Levy	Director, Sales		

Stanley L. Colbert	Assistant News Editor
Marie Adams	Editorial Assistant
Scott H. Kevauye	Editorial Assistant
Vernon J. Gossel	Editorial Assistant
Erwin J. Sullivan	Editorial Assistant

Executive and Editorial Offices: 128 West 42nd St., New York 36, N. Y. Phone  
Longways 4-9035; National Press Bldg., Washington 4, D. C. Phone National 3414

*Domestic Sales Offices:* Atlanta 1, Black-Hervey Bldg., Chicago 11, 320 N. Michigan Ave.; Cleveland 15, Home Bldg.; Dallas 20, Pennbanc Bldg.; Los Angeles 24, 420 S. Hope St.; San Francisco 4, 48 First St.; Houston, 524 South St. Correspondence in care of 48 major cities.

Foreign News Sources: London, Paris, Frankfurt, Tokyo, Bombay, Melbourne, Rio de Janeiro, Mexico City. Correspondents in more than 50 major cities.

Robert F. Enger

**Keywords:** child sexual abuse; disclosure; self-blame

J. G. Johnson, Business Manager; R. W. Martin, Jr., Sales Manager; Sales Representatives: J. C. Anthony, New York; M. J. Jura, Philadelphia; V. E. Baerle, Cleveland; L. J. Paul, Chicago; W. E. Darnell, St. Louis; J. H. Allen, Dallas; R. C. Mackie, Atlanta; J. W. Ostrom, San Francisco; C. F. McElroy, Los Angeles. Other sales offices in Pittsburgh, Detroit, Barrow, London.

André Scalet, Research and Marketing

Wardlaw & Associates, Inc., will file a 442c return if it distributes:

Journal Pre-proof

[illegible]

### *The Old-Timers Know!*

Arts education is a business and a pleasure based on experience, joy, and excitement. And the length of that experience often determines the standing of schools, classes, and users.

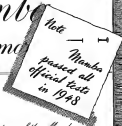
The great reputation of Phillips 66 Aviation Gasoline and Engine Oil is a result of the experience people have had with them. Phillips 66 is a name built by thousands of flying hours under all conceivable conditions. This reputation, and the people who every day rely on it, are your assurance of unexcelled quality. The Aviation Department, Phillips Petroleum Company, Bartlesville, Okla.



# Mamba

## memo

No 12



### QUIETNESS

*The noticeable quietness of the Mamba engine in flight is due to the fact that, unlike a piston engine, the exhaust gas flow is uninterrupted, and, unlike a pure jet engine, the exhaust velocity is low. The low propeller tip speed embodied in the engine design preserves this good feature.*

ARMSTRONG SIDDELEY  
MOTORS LIMITED  
Farnley, Cambs, England

Sketch of the Mamba 2300hp GTRB



### Crop Dusting Accidents

Of four helicopter accidents in 1946 resulting serious injury or death (two fatal), all resulted from persons working over the field when the craft was idling on the ground. There were 17 other crop control helicopter accidents. Survey of crop dusting accidents from 1942 through 1946, made by Ben Auband, CAA accident analyst, shows a total of 727 accidents, with 235 fatal or causing serious injury.

Of fatal accidents 52% resulted from stalls, while collision were the second most numerous type of fatal. Only one 1946 accident was attributed to an airframe failure.

Comparison of the 23% fatal or serious injury accidents in crop control with the general average for non-crop-control accidents (14%) shows that the low-flying, crop dusting operations are nearly twice as dangerous as normal flying, with the types of accident generally in one.

Studies by CAA and by individual manufacturers on the need for special type aircraft for agricultural crop control point up requirements for air vehicles which can fly slower safely, and for stall-warning devices such as have been made mandatory in some states for crop control flying.

### What Slesh Means to Navy

Airframe refinements in 1951 Navy budget will result in following developments in amphibious ship aircraft, John Flinch, design secretary of the navy for so called the National Security Industrial Security Act, last week.

- Large trainers, reduced from 5 to 6
  - Small trainers, from 12 to 8
  - Carrier air groups, from 14 to 9
  - Patrol squadrons from 30 to 20
  - Marine air squadrons from 16 to 12
- The five carriers scheduled will be added to the main fleet. Five carriers which are being withdrawn from service under the cancellation leave a total of 13 active carriers and 14 cruisers.

### McCarran vs. McKellar

Sen. Pat McCarran (D, Nev.) is on the verge of getting the Air Force to modify its \$1 billion Air Engineering Development Center in Tusconville instead of a southern Nevada area removed as a possible site. He had a conference on the matter with Air Secre-

### Favor Randolph Field

Rep. Paul Kilday (D, Tex.) says he has assurance from Air Force Secretary Symington that the Air Force's proposed air academy, where and if it is authorized, will be located at Randolph Field, Tex. However, Air Force states that it has made no definite decision on location and is continuously reviewing all sites (including 191 in 34 states) recommended to them. Congressmen and members of committees feel the Air Force is attempting to get their support for the legislation authorizing the academy by holding out the possibility that it may go to their locality.

tary Stuart Symington is the Senate Armed Services Committee last week. Sen. Kenneth McKellar (D, Tenn.) was in town to look after his state's interests. Although construction of the center is already underway, McCarran told American Voice after the meeting that the Tennessee decision "is not final, as far as I am concerned." McKellar ended his escape but left with high optimism that the center would go to Nevada. After he landed on the other side of the Atlantic, USAF ignored selection of the Tennessee site. Some state Nevada manufacturers are now complaining that if their state's location is chosen, Nevada would have a lot less Air Force installation situated valued at \$1 billion.

### Prototype Development

Department of Defense will urge a government-financed program to develop new conventional aircraft as opposed to national defense in its coming report to the Senate Intelligence and Foreign Commerce Committee, according to word passed on to Aviation.

This will create unanimous among government officials agencies, the aircraft and air transport industries the feeling that action should be taken to promote the development of advanced conventional planes. But numerous conventions over how the program should be administered seem to be compromised and solved.

Meanwhile, Army of American Railroad is set to launch a campaign against

the program as "government subsidization" of the airline. Sen. John Williams (R, Del.), strong opponent of indirect government involvement in aviation through equipment financing, will make an effort to attempt to justify prototype legislation in Congress. He was heard last week in the Senate Commerce Committee.

### Rescue Emblem

Rep. Sidney Hillman has been proud of the lives that an helicopter have saved, and that his development is a machine of mercy rather than one of destruction of life.

Now Sidney Hillman division of United Aircraft Corp. is going to do something tangible about that by issuing "rescue pins" and certificates to pilots who accomplish life-saving missions with Sikorsky helicopters, and to the persons who have been rescued.

The pins will have the brand winged S insignia used on Sikorsky fixed-wing and helicopter craft for many years, with the word "Rescue," and the accompanying certificate will state the basis for the award.

### Airmail Hike

The President is expected to recommend a hike in the investment-grade normal postage rate in the near future. His usual source in his budget strategy that he would propose legislation raising cost of mail to increase postal revenues by over \$400 million annually and partially wipe off the Post Office Department's mounting deficit, estimated at over \$943 million for this fiscal year.

### NAC Planning Again

National Air Council's anti-past "long-range aviation of prebomber and conventional aircraft" anti-war, usually makes opposing funding, but here questions of "how" have not yet been settled.

One of the most interesting points of the program states NAC will "act in a liaison capacity between government boards and industry, especially on such problems as mobilization requirements and personnel training." This is a field in which Air Force and Navy have been very active. NAC was vague in elaborating and when it intended to do in this respect and indicated that this plan, as well as others in its program, is still in the discussion stage.



# INDUSTRY OBSERVER

► Final decision is expected soon on proposed joint purchase of Marine 404 transport (revision of the T-22 transport first disclosed in *Airline News*, Dec. 29) by TWA and Eastern Airlines. Engineers from both airlines are at Baltimore going over specifications. It is expected that approximately 65 of the new-engine planes will be purchased, with Eastern buying about 30 and TWA about 35, if the deal is consummated. The airplane's speed will be about the same as that of the T-22 (entered 255 mph true speed) and both airlines have agreed to use Pratt & Whitney R-2500-CB 16 engines rated at 2400 hp, with water injection, eliminating Wright power plants which were considered as an alternative. Plans would be a 40-passenger craft, with an alternate high density screen seating 44 passengers.

► Eastern International Airways is operating in and out of LaPaiz, Bolivia using a DC-4 with JATO units, to enable the flight to comply with CAR Group weight of the plane is based on its latest performance with one engine out plus JATO. Operational data on the LaPaiz flight is being collected by other airlines, since use of JATO has not yet been incorporated into airline operations in the region. Use of JATO adds attractive possible increases in gross weight at certain critical airports.

► Series of mid-winter indicator runs (Greenie Solo Flight) on the leading edge of the XF-89 jet Phantoms are being used for research on stall patterns as well as a preventive measure against stall accidents. With new wing planform, drooping, unfilled and conventional plane models are providing additional benefits for the stall warning device, now standard equipment on the North American F-86, Greenies F-86, McDonnell and Chance Vought Navy jets, and expected to be used on other planes soon.

► A three-control Phantom was made available, but given a few experiments back before the war. Sweden Airlines expects it will be open soon, like the two-control plane, since a three-control Phantom developed before the war was criticized as impractical as well as the standard Phantom. Reason for the addition of the middle stick control is for testing plane safety. Sweden will offer a lot for conversion of present two-control planes to three-control. Kit probably will sell for \$300 or less.

► First two Navy pilots, to fly the Douglas D-558-2 Skyrocket at super speeds following test maneuvers flights in the plane by Gene May, Douglas test pilot, and Gene Tamm, F. C. Caldwell and Capt. W. V. Davis, director and assistant director of flight test at Patuxent Naval Air Test Center. Caldwell had not used second at 650 mph, since exceeded, in the D-558-2 Skyrocket, in 1947.

► McDonnell's No. 2 XF-88 Voodoo prototype fighter (afterburners removed) is back at St. Louis for repairs after a belly landing at Edwards AFB (Mo.) in which plane lost its wheel and suffered damage to belly, air intake and wing. McDonnell has officially terminated its Edwards flight test work, and Air Force pilots and ground crew take over on future flight work on the two XF-88s.

► Hughes Aircraft is scheduling flight tests for the XH-17 twin jet helicopter next September, after recently receiving a \$400,000 USAF contract to convert a static test model to a flying craft. Helicopter, developed by CH and first tested at Santa Monica, is powered by two GE T-15 turboprops at the base of the hub. Remanufactured design was developed by Kellett and purchased by Hughes.

► New indication of improved reliability of jet engines is the operational record just set by the 37th Squadron, First Fighter Group, USAF, in North America. P-51 Mustangs. Squadron has completed 2000 hr. of flight in the past year's operations, maintaining performance in a shuffling match at Las Vegas which called for doing 216 sorties in 205 hr., without a single minor or major accident.

► The Hamilton of Canada is discussing a plan with the RCAF and the Canadian flying club under which approximately 50 de Havilland two-place biplane trainers (former Cessnas, at a cost of approximately \$500,000, would be made available for the club's use. Airplane is the same model now used by the RCAF as its primary trainer.

► Bellanca Aircraft Corp. has made some studies on large jet transports, and may seek to offer them for consideration in Washington in the discussions of transport prototype sponsorship by federal agencies.

# WHO'S WHERE

## Changes

► New Appointments—Richard L. Johnson has been named assistant to the president of Glenn L. Martin Co. in Lockheed Aircraft Corp., named Robert E. Keady assistant to its sales engineering dept. — Larry G. Cardfield will leave Standard Thompson Corp.'s chemical and metallurgical laboratories in Dayton.

John H. Stark has been appointed staff representative to the president of the United Air Lines. He will represent negotiations and purchase of all petroleum products and facilities used by the airline. — Delmon E. Kow was named assistant to the president of the National Bureau of Standards.

Carroll and Perreault, Inc. has named three officers for its new division, Airplane, Equipment, and Parts. — Frank M. Freeman, president, William E. Keady, vice president, Frank M. Sullivan, vice-president; William E. Keady, secretary-treasurer.

William B. Hayman now heads up engineering and development section at Airborne Instruments Corp. — Kenneth L. Hart, has named John McVey general development engineer to assist research into applications of Kardonite, new heat resistant material, to jet engines.

► Research—Yveson Gault, general manager at British Overseas Airways Corp.'s western division, has resigned. B.O.A.C. and his services will remain available during 1950 to facilitate carrier negotiations.

Mr. Keady, administrative assistant to American Airlines engineering vice president, is resigning effective Jan. 31 to do professional work for a new project of Cable Cable, Aircraft Specialist, in field men's work at Montreal, Long Island. Planned to be a (secretary's) position at Montreal, enough to call "Thompson."

► Sales Skills—Norman A. Allen is director of sales for American Airlines western division. — J. Russell Wain has been named chief manager of industrial, chemical and metallurgical materials for General Electric Co.'s chemical division. Capital Airlines named John B. Anderson sales promotion manager. — Robert G. Overman has been named advertising manager of Stewart Warner Corp.'s South West division.

## Elections and Honors

Howard S. Collins and Joseph M. Tove, Jr., were elected chairman and vice chairman respectively of the Port of New York Authority at the agency's annual meeting.

Belg. Gen. Donald N. Yates, chief of the Air Weather Service of Military Air Transport Service, was elected president of the American Meteorological Society for a two-year term at its annual 10th anniversary meeting in St. Louis.

Joseph E. Johnson and Edwin White, directors of Northwest Airlines, were named with 13 other service pilots as recipients of the active parts they played in the development of the carrier.



Air Force's new navigational trainer, Consolidated Valiant T-29 "Flying Classroom," with Hamilton Standard propellers.





## ...You'll find more and more alert airports selling CITIES SERVICE products



A top line of petroleum products and services is a big plus for any airport. That's why you'll see more and more of the famous green and white emblems of Cities Service prominently displayed at airports in all parts of the country.

These alert airport managers select the Cities Service line of aviation petroleum products for these good reasons. Every product is checked and rechecked for quality and performance. There are backed by extensive and progressive research. And all Cities Service products are marketed and distributed by a wide mobile completely integrated oil company that knows the aviation business from the ground up.

Keep your eyes open for the familiar green and white emblems of Cities Service at private and municipal airports alike. Use these famous products—

- Cities Service Aviation Gasolines
- Cities Service Kerosene/Air Oil
- Cities Service Chlor Solvent engine decelerator
- Cities Service Traps Aero Greases and Aviation specialty lubricants

### CITIES SERVICE

### AVIATION PRODUCTS

New York • Chicago • In the South—Arkansas Fuel Oil Co.

Vol. 52, No. 4

# AVIATION WEEK

Jan. 23, 1950



BORING PRODUCTION OF C-95 new fully variable line of Seattle, but that new wonder what happens when end of line is reached.

## Factions Open Fight Over Plant Dispersal

### Midwest and West Coast groups square off in battle for congressional support.

Principal military aircraft manufacturers, the USAF and the Navy Bureau of Aeronautics are caught in the middle of a political situation that could affect their present and future locations of aviation installations and plants.

Trapped on the two sides are:

- **Mid-Continent Industrial Council** with a membership of business and civic leaders of Texas, Oklahoma, Kansas, Nebraska, South Dakota, Iowa, Minnesota and Arkansas.

- **All-American Defense Area** which originated in the Pacific Northwest, but now has active support from the Pacific Coast states, the Rocky Mountain area, the Great Lakes region and New England states.

The Mid-Continent group contends that dispersal is "definite" that key industrial plants and aviation installations be "dispersed" inland with the rest of the nation's war production as a forerunner of a new "war" with leadership in Kansas City, the council has campaigned at long range for its "no-

plant" position with brochures and pamphlets sent to Washington, but has not, at least specific, had much personal representation in Washington.

• **Administration**—Earl Brower, governor, however, claims that it is "in" with the Treasury Administration and credit it is part, with coming a relocation in Boeing B-47 bomber production from Seattle to Wichita, Kansas, of the Clinton Wright plant from Indianapolis, Conn., to Tulsa and other shifts.

All American Defense Area which originated in Seattle, interests in a project against the Wichita location of B-47 production and USAF's refusal to situate the 51 billion Air Engineering Development Center in eastern Washington because of "strategic vulnerability."

• **Civilian Consultation**—With considerable backing, AADA is calling for "adequate defense" for Alaska, for the west, south and east perimeter areas of the continent, and for greater civilian participation in Department of Defense decisions. It is attacking "isolation-

ist military decisions" and pushing for increased civilian service consultation with civilian business, labor, and civic leaders. These two groups coincide with the self-serving objectives of AADA. To build industries and secure new military business and installations for the area it represents.

AADA's public look off meeting in Washington last week drew an audience of 1000 to hear its speakers: Sen. Warren Magnuson (D., Wash.), A. L. Hayes, president International Union of Machinists, Rep. Harry Shipper (D., Calif.), Gov. Ernest Gruening of Alaska, William Brewster, Salt Lake City businessman and chairman of the board of National Area of Manufacturers, Kansas City attorney-in-charge of defense, Sen. Warren Magnuson (R., Ore.), Sen. Hiram Bingham (R., Utah), Sen. Arthur Watkins (R., Utah), Sen. Hiram Bingham (R., Utah), Sen. Hiram Bingham (R., Utah).

• **Not Controlling—Aircraft Industries** Area reports that its members have not, and will not, contribute to the financial support of either organization and that it "wants to keep out of the national fighting." But its representatives are already being led by the industry.

On the side of the Mid-Continent

- **Crewed** is the fact that two large land-based World War II-bomb aircraft plants in its area at Tulsa and Omaha, are not being used except for storage of tools and parts.
- **Flowing Rivers**—Among typical unconfined nation which were flying in Washington last week about plant locations were these four:
  - That Lockheed never moved part of its production to the Tulsa plant, which Douglas had occupied during World War II.
  - That the Lockheed move would not be to Tulsa but to the Omaha plant owned by Glenn L. Martin Co. in World War II.
  - That Lockheed would not move to Omaha but would remain on the West Coast. That last rumor is confirmed by company statement.
  - That production of the new night fighter (intercontinental) XB-52 might be moved to J.F. Wright to follow the Convair B-36 down the production line which it is to become obsolete and its production was cut.
- It is understood that Boeing would like to build the XB-52 in quantity at Seattle, where the prototypes are now under construction, and where the financing of B-52's is assured. Production schedules will open up production capacity which was not available at the time the B-47 production was scheduled at Wichita (Aviation Week, Jan. 18).
- **State Police**—Air Force and Navy Dept. officials take refuge in the Administration's stated policy. No one is considered "to be too secure for the defense production than other areas" but capacity within each area must be developed.
- **Department of Defense** disallows any plan to shift military business inland, is advocated by the Mid-Continent Industrial Council and unsuccessfully is referred to as "the attack approach to defense" by AADA/USAF/ airplane that the shift is heavy bomber production from Seattle and the switch in the Air Engineering Development Center were increased by an even concentration of vital establishments in a small area in Washington state. National Security Resources Board, however, a contributing to that of "transfers which seek to bring to protect American industry and the general public to the maximum in the event of an emergency."
- **Political Maneuvers**—Air Force and Navy, interrelated on recent in political maneuvering, are now divisions by AADA and Mid-Continent industries in Congress this session, and both are apprehensive of the threatened "interference."
- **There are three developments:**
  - **Michigan** has already indicated area

- 200 congressmen to pressure AADA approval through legislation, appropriate, and political pressure. A transfer movement of inland area companies is a military order.
- **More** has successfully presented a "demonstration" of Alaska and Pacific Coast defense by the Senate Armed Services Committee, at which he was asked to shift plant locations in a few weeks, and possibly in an action plan in the program for defense from Pacific coast. The threatened Convair move, unopposed, into Fairbanks has suggested widespread fear in this sector in the West.
- **Sen. William Knowland** (R., Calif.) observing on the Senate floor typified the general sentiment. "If I borrow gets into military lands, our Japanese-Chinese-Panama defense is placed and the Pacific Coast may have to become our last line of defense. . . . I advise therefore that in Washington who advocate moving some of our large industries out of the district of Washington, Oregon, and California. If we are to make the Pacific Coast our outpost line, this is undesirable."
- The political election that you figure strongly in the picture. Democratic gains are considered over possible development of such Administration agreement on the Pacific Coast, particularly in Washington state where Magnuson is up for re-election. Maine is up for re-election, and Bennett, who is a key voter at the AADA lock-out, is the likely Republican Senate candidate in Utah. Both AADA and Mid-Continent Industrial Council will have popular in general campaign areas.
- **Anti November**—There is speculation that both manufacturers may shut out after the November contest-like a program set forward by Sen. Pat McCarran (D., Nev.) during his 1944 campaign. He suggested to keep of factories on plants on or until all Western plants had been used in order to achieve a balanced East-West economy. East coast factories against it as the campaign and Western (thundered by it but afterwards both sides it did).

## PAA Offers \$582 Holy Year Package

Pan American Airways will offer a two-week Holy Year all-expense tour for \$582, giving freedom travel agencies and other carriers to provide service to Rome, Nice, Paris and London.

The tour plan, which expires on Mar. 16, was worked out with PAA's agreement with Pope Pius XII, according to Willie C. Ligon, PAA vice president traffic and sales.

Pan American will provide service from New York to European gateways

- and return. European carriers will transport the tourists to the other cities. PAA is also offering a 11-day trip, including London, Paris, Milan and Florence, for \$325.
- ## Hap Arnold
- ### Air Force's first five-star general dies of heart attack in California.
- By Alexander McHenry
- An up in military aviation closed last week when General of the Air Force Hap Arnold died at 64, and (Jan. 13) at his home in San Jose, Calif.
- "Hap" Arnold retired in 1946 after he had commanded the greatest air force the world has ever known, which consisted of nearly 3,500,000 men, and 70,000 planes in World War II. Probably never again, due to development of atomic and hydrogen bombs and long-range rocket missiles, will placed actually play such an important role as he did in war.
- **Early Build-Up**—Gen. Arnold began his aviation career in 1913 as one of five early Signal Corps officers who looked to fly with the Wright Brothers. Actually his flight instructor was A. L. Wells, a civilian pilot at the Wright Flying School at Dayton. But the start of the early Wright students, Gen. Arnold had a rudimentary ground school training and checking flight, the burden themselves. (Of the other officers, only two, Brig. Gen. Thomas Dewart Milling, Washington, who accompanied Gen. Arnold to Dayton, and Brig. Gen. Frank Lakin, Cleveland, who were killed in war.)
- Beginning with early flight exploits as a new altitude record of 4167 ft. and winning the first Mackay trophy for a 20-mi. cross-country reconnaissance flight, he flew to Los Angeles, N.Y., to Ft. Myer, Va., and return. Gen. Arnold had a long official record in aviation. In World War I he was executive officer and assistant director of the Signal Corps, and one of the few aviators.
- **Air Power Apostle**—A campaigner for air power in the middle 1930s, he received a appointment from his superiors for supporting proposal of an autonomous air force.
- **Post-war**—During a flight of 30 March B-10 bombers to Alaska, on 13,800 mi. flight to prove long-range bombing theories, he won the Mackay trophy a second time in 1934.
- **Second World War**—In 1935 he had assumed the task of bringing ground and post of assistant chief of the Army Air Corps, leading the Air Corps after his predecessor, Maj. Gen. George Westcott was killed in a plane crash.

- **Publicity-minded** representative Arnold appeared in aggressive public relations campaigns about the Air Corps during "the world's finest" planes and pilots, avoiding the busy core of his pre-war 2000 plane Air Corps. A raised plane demonstration at Wright field in Aug. 1938, brought in a crowd 165 planes for the show. But shows like this and Air Corps publicity on a breathless brought public awareness of the Corps' potential.
- **Congress Prepared**—They helped prepare Congress for appropriations necessary to finance the huge World War II Army Air Corps, which Arnold as deputy chief of staff for air helped plan, and then started to build with a during months on engine.
- **His responsibility** increased with the growth of his organization and he rose in rank from major general to lieutenant general, then to become the first five-star general who was wing, and finally the first five-star stream general of the army.
- **Advance to Roosevelt**—An aviation advocate to President Roosevelt, he accompanied him to the significant big power conference at Casablanca, Y. Genes and Yalta.
- **As a writer** he is best known for two books, his most autobiography, "Childhood," and a pre-war volume "The Flying Game," which he and Lt. Gen. Ira Eaker wrote in collaboration.
- **He retired** his first best book in 1944, but remained in active service for two years, before retirement. Following his attack, Arnold was in a coma, which caused his death. His body was flown to Washington for military funeral at Arlington Cemetery.

- **Aviation** general, then to become the first five-star general who was wing, and finally the first five-star stream general of the army.
- **Advance to Roosevelt**—An aviation advocate to President Roosevelt, he accompanied him to the significant big power conference at Casablanca, Y. Genes and Yalta.
- **As a writer** he is best known for two books, his most autobiography, "Childhood," and a pre-war volume "The Flying Game," which he and Lt. Gen. Ira Eaker wrote in collaboration.
- **He retired** his first best book in 1944, but remained in active service for two years, before retirement. Following his attack, Arnold was in a coma, which caused his death. His body was flown to Washington for military funeral at Arlington Cemetery.

- **Aviation** general, then to become the first five-star general who was wing, and finally the first five-star stream general of the army.
- **Advance to Roosevelt**—An aviation advocate to President Roosevelt, he accompanied him to the significant big power conference at Casablanca, Y. Genes and Yalta.
- **As a writer** he is best known for two books, his most autobiography, "Childhood," and a pre-war volume "The Flying Game," which he and Lt. Gen. Ira Eaker wrote in collaboration.
- **He retired** his first best book in 1944, but remained in active service for two years, before retirement. Following his attack, Arnold was in a coma, which caused his death. His body was flown to Washington for military funeral at Arlington Cemetery.



BOW BLIND LINE LOOKS like proper approach to ALFA says CAA's ADA's note.

## CAA Withdraws Slope Line Support

Study shows terrain problems make it impractical to use approach systems at half the airports considered.

- **Civil Aeronautics Administration** has withdrawn its support for the use of slope line approach systems which were designed to use the U.S. standard for high intensity approach lights at both civil and military airports.
- **The move** was made after CAA Administrator Denis W. Rensel told the Mountain Road's Airway-Navy-Solomonair on Ward Ave. in San Francisco, he and studies had shown that terrain problems make the slope line approach system impractical for at least half of the airports considered for the new high-intensity lighting system.
- **ALFA** (Airway-Navy-Solomonair) action represented a victory for the Air Line Pilot's Assn., which has strongly opposed the

- **Civil Aeronautics Administration** has withdrawn its support for the use of slope line approach systems which were designed to use the U.S. standard for high intensity approach lights at both civil and military airports.
- **The move** was made after CAA Administrator Denis W. Rensel told the Mountain Road's Airway-Navy-Solomonair on Ward Ave. in San Francisco, he and studies had shown that terrain problems make the slope line approach system impractical for at least half of the airports considered for the new high-intensity lighting system.
- **ALFA** (Airway-Navy-Solomonair) action represented a victory for the Air Line Pilot's Assn., which has strongly opposed the

- **Civil Aeronautics Administration** has withdrawn its support for the use of slope line approach systems which were designed to use the U.S. standard for high intensity approach lights at both civil and military airports.
- **The move** was made after CAA Administrator Denis W. Rensel told the Mountain Road's Airway-Navy-Solomonair on Ward Ave. in San Francisco, he and studies had shown that terrain problems make the slope line approach system impractical for at least half of the airports considered for the new high-intensity lighting system.
- **ALFA** (Airway-Navy-Solomonair) action represented a victory for the Air Line Pilot's Assn., which has strongly opposed the



tion, the angle-of-attack, center line, require a minimum of load exponent, an important factor because of the increasing difficulty encountered in controlling ground, unpowered, free-fall, and radio-assisted, SRV, vehicles.

■ **KGAO Action**—During a meeting in Montreal late last year, the Aerobionics, Air Research and General Aid Division of the International Civil Aviation Organization examined three approach light systems and recommended there all as being satisfactory. The U.S. sponsored the slope line. The French backed a single-line system of lights parallel to, but offset 100 ft to the left of, the extended runway center line and having three crossbars.

Great Britain favored the Collet circular system, consisting of a bar of lights on the extended center line of the runway, together with additional bars of lights arranged symmetrically and at right angles to the center line as they run later. The bars decrease in width towards the runway threshold to provide glide path guidance to the point of touchdown.

■ **Midfield Setup**—The recently activated slope line at New York International Airport gave many airline pilots their first experience with the three-dimensional approach light system. Sixty individual light assemblies are used in Midfield's double-line system, each assembly forming a 45 degree angle with the ground.

Light spacing between the dyads is 100 ft. Individual dyads in the system are rated at 330 watts and provide 51,500 candela per sq ft at maximum brightness setting. Ten white solid beam lamps are placed along the 14 ft length of each dyad.

The level of intensity, controllable from the tower, are available. Lowest level is adequate for normal clear weather night approach. Higher levels are used for reduced visibility. The tower's influence is reduced for day time operations in poor visibility when high background brightness tends to reduce effectiveness of the lights.

■ **Continental Layout**—When the plane's approach is begun, the U.S. planning approach, the two rows of lights turn to focus continuously. The projected point of contact of the slope line system coincides with that of the ILS. Discussion here, the proper approach path either horizontally or vertically is indicated by the message in which the row turns up or cathode. In case of deviations to the left, each bar will "lean" toward the right-on-flight point, the deviation toward the correct path.

Right deviation will produce an opposite effect. When the plane is below the proper path, the bars appear to point upward, and the reverse is true when the aircraft is above the path.



WITTMAN and Conquester II model.

## Wittman Repeats, Sets Miami Record

Sylvester (Bibi) Wittman, Oklahoma, who, famous school teacher, football coach and airplane designer, was the Conquester II's trophy magnet place men at Miami for the second successive year.

His record, nine-mile pusher, his little yellow plane, made time, "Bama," to a 181.4 mph average over the 30-second final curve for a new high speed at Miami, well ahead of his competitor Keith Stevens of La Crosse, Calif., in a great course. Wind came out against with a 182.044 mph average, Bob Downey, Whittier, Calif., set final with 174.774.

■ **Get Packed**—Wittman was disappointed for the good money for his first professional kept in which he set a prize, but was permitted to continue in some position, and was a total of \$2750 in clearing the \$1800 final first prize.

Barney Jacoby, Langhorne, Pa., won time RAF fighter pilot was the motor national aerobics championship, in a Great Lakes biplane with 160 hp. Kierkegaard, against a competitor, flew a biplane, "Bambi," Howard, Charleston, S.C., defeating champion, and Beth Stiglich has won a women's championship. This year the competition sponsored by Gulf Oil, was flown from 100 ft to 100 ft and was a great success.

■ **Cross Landing**—Aerobics set a National Cross F-30 jet fighter crash land, after it had lost a right elevator when struck by the wing tip of another F-30 flying in light aerobics form with it. On a game, the Lt. Col. Bill DeWitt, leader of the first phase "Bambi" formation and pilot of the plane's crash, continued in a rough-on approach, touched down at about 100 mph in a field near the airport, plowed through trees and

came to rest near a herd of cows, with the plane washed out, but the pilot not seriously injured.

Highlight of the exhibition flying was the demonstration of the French Fouga Cougar, SRV jet, lightplane, powered with a 1000 hp, air-cooled developing approximately 180 hp. The one-place cockpit, with long nose and plane wings, is capable of soaring with the engine out in level flight. Powered by 1000 hp of thrust, is capable with 180 mph speed in level flight.

## IAS to Make Awards At Honors Dinner

Being still captured George S. Scherer will receive the Sylvester Albert Award, for analytical and experimental work contributing to design and development of large swept-wing high-speed aircraft, at the Institute of the Aeronautical Sciences 1970 Honors Night dinner, at the Hotel Astor in New York City.

The Institute's 15th annual meeting, from Jan. 22 to Jan. 26, will open with the Honors Night dinner tonight at which Walter Lippman will be the principal speaker. Other awards

■ **Robert N. S. Award**, to William Lewis, U.S. Weather Bureau meteorologist, whose research provided quantitative information on meteorological conditions conducive to the formation of an icy airframe, enabling design of aircraft with de-icing equipment by electrical methods.

■ **The Lawrence Sperry award**, to A. H. Flux, Cornell Aeronautical Laboratory, for significant additions to methods of determining the aerodynamic behavior of airplanes, helicopters and missiles.

■ **The John Jeffries award**, to Arnold D. Tittle, United Air Lines medical director, for his outstanding contributions to the advancement of aeronautics through medical research.

IAS will award a special certificate to Jerome Ladouce, director of the Flight Safety Foundation, for outstanding contributions in engineering for flight safety and for setting others to encourage research in this field.

Daily sessions will cover the following subjects:

- **Jan. 13**—Scheduling wing aircraft in streams, aerodynamics.
- **Jan. 14**—Aerodynamics; aerodynamics; London speaker, Ross Alan C. M. Bolter, chief of research and development, Bureau of Aeronautics.
- **Jan. 15**—Aerodynamics; aircraft design; air transport, London speaker, May Gen. Donald L. Pitt, director of Research and Development Office USAF.
- **Jan. 16**—Symposium on jet installation design problems.

## 70-Group AF Outlook Dim

Prospects for another congressional fight with President Nixon on the 70-group Air Force issue last week had dimmed to a new blacker.

After a week's session with its less vocal leaders on the Truman 40-group program as outlined in the 1971 fiscal year military budget (Aerobics Weekly, Jan. 18), Rep. George Mahon (D., Tex.) one of the strongest 70-group advocates on Capitol Hill and chairman of the House Appropriations Subcommittee on the Armed Services, admitted the Truman political tactic of postponing last year's extra USAF funds was a tough one to beat.

He told Aerobics Weekly:

"Within the framework of its \$13.5 billion ceiling, the President's military budget is good. Of course, we regret that he did not go stronger with regard to Air Force funds."

"But, in view of fact that funds appropriated last year to implement a 70-group program have not been expended and Congress does not have the power to control this action, I doubt that there will be any serious controversy over the matter this year. We have made clear our position of aerobics support for the 70-group program. But we have to be practical and face facts."

## NACA Report

Practical supersonic military planes now in reach of every nation.

In planning its future air force, the U.S. will have to answer with the certainty that any nation willing to make the effort can build supersonic military aircraft. Dr. Jerome Threlkeld, chairman of the National Advisory Committee for Aeronautics, stated last week in the agency's annual report to Congress.

Pointing out that both USAF and Navy are making "great efforts" in following the design of operational transonic and supersonic aircraft, "the NACA chairman estimated that the experimental aerobics flights already made have clearly indicated that the fundamental aerodynamic problems of supersonic flight are now solved."

■ **Supersonic** of the Housley style

most as an indication that the close conflict between Air Force and Navy to support his again rising in favor of the Air Force's view that the engine design, which was the first real step in aerobics, now has to be taken up. Whereas the Air Force engine design, for greater power than they had had previously, the challenge is now somewhat reduced and it is necessary that some be found to replace the present propulsion system for aircraft being designed for transonic and supersonic flight.

■ **Aerobics**—United Nations sponsored investigations have placed increased emphasis on low-speed aerobics of high-speed flows. NACA studies show that leading edge bluntness, shape and trailing edge gaps affect practical problems in the problem of speed stability of supersonic and delta wing planforms. The one-number and based in swept wings also shows promise of improving low-speed stability.

Boundary layer control studies still called conflicting, although it is obvious of advantage not isolated. Investigations of leading edge and trailing edge vortices also designed to improve the low-speed stability of very thin wings. However, the use of sections in the aft portion of thick wings, such as are used more the root of long range bombers, promises substantial reductions in drag and consequent range increases.

■ **Stability and Control**—Unconventional forms of high-speed aircraft have improved the stability and control problems. Extensive research on documen, behind revised flight plans to determine the best tail location showed that the downwash combined with a smaller wing and swept wings than for conventional wings, indicating the desirability of a low tail position for sweptback wings.

For supersonic speed, design studies indicate that the stability and control without sweptback would have better performance than other wing arrangements.

■ **Stability of delta-wing models** having various aspect ratios, vertical position and vertical air characteristics have been investigated at the Langley Laboratory. It was found that the wing thickness has an appreciable effect on stability but the arrangement of the vertical fin is well indicated as the most important lateral and directional stability factor.

Investigations of the plug return for use with tailfin fins indicate an increasing field of methods for that device in high speed aircraft.

■ **Recent**—A report on NACA technical activities during the year will be carried in the Aeronautical Engineering section of an early issue of Aerobics Weekly.



## Aeroproducts Names Peerce Sales Chief

Appointment of Geoffrey C. (Ged) Peerce as general sales manager of Aeroproducts Division, General Motors Corp. at Detroit, effective Feb. 1, is announced by Mrs. M. Monroe, Aeroproducts general manager.

Peerce has been Washington representative of Alcoa since 1960, General Motors Corp. for the past four and one-half years, and recently has been conducting the program and development liaison work with the Navy on the Alston T-45 turboprop engine, and similar work with the USAF on F35 and F35 fighters.

He served as Mediterranean manager and service representative for Alcoa during World War II, working with the Indian, French, Turkish, Egyptian Air Forces as well as with the USAF.

A former USAF pilot, Peerce was associated with various airlines in Chicago, after attending Washburn College and Butler University. He has been with Alcoa for 10 years.

At Aeroproducts Peerce's first assignments will be to direct a sales program for the division's engine and fuel system products designed for general (aerobics) turboprop engines, and new programs on aerobics and engine controls.

## Munitions Board List

Munitions Board has issued a new revised index of military purchasing offices as a guide to selling to the armed services.

Copies of the index may be obtained from Central Military Procurement Information Office, Munitions Board, Department of Defense, Pentagon Bldg., Washington 25, D.C.

100



### Small Load Truck

Three-wheeled Silbury state-of-the-art truck, built for speed and fuel economy, is capable of hauling a 600-lb. load in addition to driver, is offered by Wayne Mfg. Co., Fremont, Calif. A 4-hp engine is coupled to a completely automatic transmission, making for easy ramp climbing as well as providing ease of operating control with manual clutching.

Load is loaded by means of a spring-loaded, independently sprung front wheel.

The non-splittable worm-type steering gear is controlled by a steering wheel. Coil spring rear suspension allows riding comfort for driver.



### Large Jig Borer

No. 4-E Vertical Jig Borer, designed to be largest ever built, is capable of locating and boring to .001-in. accuracy with work load of 25 tons. This 15-ton precision machine, made by Pratt & Whitney Division, Milwaukee Road Co., West Hartford 1, Conn., is designed with open-side construction to provide maximum clearance in placing and holding work stage of work.

It has 56 x 72 in. rectangular table

with 60-in. longitudinal travel and 36-in. transverse travel. Maximum standard height from table top to spindle axis is 51 in. However, columns 6, 10 and 14 in. higher can be furnished to increase machine's vertical capacity to 67 in.

No. 5 Nine types can be held in square with column and spindle axis cap. The 51-in.-dia. quill has 10-in. vertical travel with power feeds (back up and down) ranging from .0015 to .015 in. per revolution of spindle. An adjustable dual indicator depth gage with powder stop is built into spindle head for accurate boring to depth.

Switches controlling various functions of machine are concentrated on pendant control station, adjustable to suit operating conditions.

Since machine is exceptionally large for its type, it is equipped with new P&W hydroboost steering system to place of standard and accurate guidance. Horse power required is about 121 x 11 ft. Approximate overall height (using highest column) is 17 ft.



### Versatile Wheel-Skis

For all new operations of small planes in severe climates, combination wheel-ski for light aircraft, providing loadings and takeoffs on either bare runways or deep snow, are offered by Federal Aircraft Works, Minneapolis, Minn. Skis are claimed to be designed from proven types used successfully by the AF and WCAF on observation, liaison and transport aircraft.

Wheel-ski attach to landing gear and can be hydraulically or electrically controlled from the cockpit. They are lowered below wheel fairing for operation in deep snow and raised when it is necessary to make wheel landings on bare surfaces.

Engineered ski is available without hydraulic or electrical operation—can be placed in third position on gear about 1 in. above rolling radius of tire. This arrangement is said to afford seasonally good ski plate performance under normal snow conditions.

Special features can be obtained permitting ski to be manually set either below or above wheel fairing. Skis also can be positioned underneath tire for shock absorber, or which can be arranged to allow for operation of aircraft on dry alone.



### Aluminum Fittings

All-atomium Unalutec fitting with a self-flaring feature and lock-and-seal is offered by Seawall Mfg. Co., Waukegan, Ill., for use with standard aluminum tubing. Body of fitting contains flaring cone and nut contains thrust collar. Turn of nut is sufficient to shear off collar, and further tightening clamps collar to tube, forming seal and to be locked.

Manufacturers claim there is no danger of hole cracking during flaring, and claims aluminum fitting offers opportunity to use standard weld taking other than heat-affected zone usually required to provide extra strength. Fitting may be disassembled and reassembled many times without impairing tightness of seal.

The unit is available in all standard weld shapes, as made-to-order sizes for use with tubing 1/8 in. through 1 in. o.d.



### Production Grinder

Expensive belt grinder, offered by H. L. Bremer & Co., La Grange, Ill., can be set up quickly for face belt operation, form wheel work, contour grinding, face contour grinding when track slack is removed and for plates per cross grinding.

Used or dropped on to with one turn of a clamp, change belt can be set at any angle. Several of these devices can be set above each other with contact wheels or placed directly in front of the operator. With this arrangement, the one rough, semi-finish and finish grind with little movement.

## Equip for Long Faithful Service

with

## SIoux BENCH GRINDERS



### SIoux 10" BENCH GRINDER

No. 2025-10"—1 H. P. ball bearing motor—oil packed and sealed—no fan for lubrication. Extra wide enclosed guards accommodate wide brush. Safety eye-shield, adjustable tool rest. Conveniently located lights with shades. One power—one free grinding wheel. Rated 1735 R. P. M. Pedestal available.



### SIoux 6" BENCH GRINDER

No. 2025-6"—1/2 H. P. Ball bearing—packed and sealed. Adjustable tool rest. Rating 3450 R. P. M. One free—one extra grinding wheel.



### SIoux 6" HEAVY DUTY

No. 2025-6"—1/2 H. P. ball bearing motor. Oil packed and sealed. Enclosed guards. Rated 3450 R. P. M.



### SIoux 8" BENCH GRINDER

No. 2026-8"—1 1/2 H. P. Ball bearing, permanently lubricated. Adjustable tool rest. Rating 3450 R. P. M.

A SIZE FOR EVERY NEED  
Priced to fit  
your pocketbook.

• SIoux grinders are correctly designed, precision machined and carefully assembled to give smooth, steady operation year after year. Oil packed and sealed—ball bearings.

Operators everywhere have a word for QUALITY in power tools—It's SIoux. Ask your lobbyist for details.

Sold only through Authorized SIoux Distributors

STANDARD THE  
ALBERTSON & CO., INC.



WORLD OVER  
SIoux CITY, IOWA, U. S. A.

**VICKERS** Hydraulic MOTORS  
(PISTON TYPE—CONSTANT DISPLACEMENT)

(PISTON TYPE—CONSTANT DISPLACEMENT)

*Have All These Advantages*

- EXCEPTIONAL HORSEPOWER TO WEIGHT RATIO
- LOW INERTIA OF MOVING PARTS
- CAN BE SEALED INDEFINITELY WITHOUT DAMAGE
- WIDE VARIETY OF MODELS FOR PRESSURES TO 3000 PSI

Many difficult aircraft power application problems are being solved most satisfactorily by using these hydraulic motors to produce highly efficient rotary motion.

Vickers Aircraft Hydraulic Motors have a very high horsepower/weight ratio... some models deliver as much as 245 hp per lb. *Not other motors pack so much power in so small a space. Because of the low inertia of moving parts, these hydraulic motors can be started, stopped and reversed almost instantaneously... not being thus grossly over loaded for profiling strokes where accurate control is needed. He slatches or leashes are required in these Vickers motors can be installed satisfactorily in any position without damage. Starting or reversal torque is up to greater than running torque of design. They will deliver low r.p.m. loads for*

Wickens (Johson type instant displacement) Hydraulic Motors are inherently simple and rugged, with resulting long life and minimum maintenance. They are easily installed and safely adaptable. Write for Bulletin 45-51, "The Most Complete Line of Hydraulic Equipment for Aircraft."

**VICKERS** Incorporated  
DIVISION OF THE SPERRY CORPORATION  
1462 OAKMAN BLVD.  
Detroit 33, Michigan

DIVISION OF THE SPRAY CORPORATION

1462 DAKMAN BLVD.

**Detail 32. Michigan**

Vietnam Media RF-2012 Center  
for 1000 mail

Yokoyama Model MF-2000 Series  
for 2000 psi

Victory Model M F-2014 (2014)  
 (see 2014 vol.)

Valenti Model MB-2015 Series  
 Rev. 2009.04.01

Violence Against Women Act (VAWA) 2013 (2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 2681, 2682, 2683, 2684, 2685, 2686, 2687, 2688, 2689, 2690, 2691, 2692,

Victims' Rights Act, 1990 (Criminal Justice Act, 1990)

## AERONAUTICAL ENGINEERING



## First Details on Russian-Built Transport

Czech-operated plane on service to London shows performance and design comparable to western craft.

(McGraw-Hill World News)

**LONDON**—The almost complete covering of secrecy surrounding all Soviet civil and military aviation has obscured largely the fact that the U.S.S.R. has in service a transport, which in numbers, make it come within the small list of the world's most widely used airlines. This is the two-engine, 23-32 passenger Il-

It appears that there are in service about 200 of these crafts—about 50 percent more than the number of Convair-Learns in service or about 20 percent of the Douglas DC-7s now employed on scheduled airlines outside the U.S.S.R.

• **Base of Estimate**—This figure of 200 IL 124 has been determined after a careful survey of Soviet airline timetables, from which it seems that from 120 to 130 of these aircraft are in daily

Many Soviet air services depart early in the morning and, since these early departures reduce night hours available for maintenance, it seems reasonable to suspect that to keep 120 to 150 planes flying, approximately 200 of this type are on the roster of Aero-Flot, the Soviet airline.

Additional support for this figure is less reliable but may well be fairly near the truth. This is the actual cost

registration of the IL 12s. Each Soviet civil plane bears its international lettering the letters SSSR, which in Russian characters look to us like СССР. Airlines in the DC-3 and IL 12 class have also the letter L followed by a number.

Earliest number allocated to an M. 12, for which there is photographic evidence, is 1382. Numerous other numbers in the 1300 series have been seen, while the highest number observed says this batch is 1403. This suggests, although it cannot be proved, that an initial production batch of something over 100 cabs was constructed.

In 1948, almost two years after the IL 12 had appeared, one of these places was exhibited in various European capitals, including Helsinki and Prague, and that was number 1701. No registrations between 1493 and 1700 have been reported, but a number 1721 has been seen and, more recently, number 1834.

unrest has been produced starting at 1700, and it may be that the first beach began at 1500. Assuming that both groups were of the same or similar size, this confirms the sense of something

• **Line Use**—In addition to the BL 12s operated by AeroBot, 2 BL 12s are in service with the Czechoslovakian Air Force.

CSA and 3 more are on order for that company. Polish Leon Łotwinski, the Polish airline has just placed an unspecified number of this type in service. It is reported that TARS, Romanian-Soviet airline, has 5 IL 12s on order, and it is known that the Red Air Force has adopted this type as its standard parachute troop and military cargo-carrying aircraft.

In the last two years, Aeroflot has steadily replaced the IL 2s (Soviet name for the DC-3) with IL 12s on Soviet domestic routes. It is reported that on the Moscow-Leningrad-Helsinki twice weekly run, the IL 12 had only been used about four or five times recently.

Probable reason for this scarcity of the IL 12 on the international route came to light when one of the two Czech-operated aircraft came to London's Heathrow Airport. At one time this craft had carried a Soviet civil registration when it later had its Czech lettering, and it also had a major modification to its vertical stabilising fin, which had been increased in size by addition of a spine fin similar to, but larger than, that on the DC-3.

It seems likely that one or a series of unpleasant experiences or even accidents caused by an engine failure at minoff had turned the Russians to work

AVIATION WEEK, January 22, 1950

2

Engineers and Builders of Oil Hydraulic Equipment Since 1927



## Plastics Research Accelerated

Increasing aircraft performance brings new demands on characteristics for transparent enclosures.

The Air Force recognizes that improved vision is essential to aircraft design. So long as we have pilots in aircraft, the development of transparent materials for windows and canopies will be necessary to meet new requirements for vision and protection.

Progress in aircraft design has always resulted in the need for improved pilot-to-aircraft materials. The cellulose nitrate (cellulose nitrate and cellulose acetate) was dominant until 1916, when acrylic plastics of high clarity and good weathering durability became available. In the years that followed, the development of this material has periodically affected aircraft design. Evolution of the plastic nose of the B-52 from the early projecting wind deflector represents the transition from a major attachment to a structural part. Today, therefore, transparent plastics are vital materials.

► **Characteristics Needed**—Principal requirements for transparent materials in aircraft are, in order of their importance, low density, clarity, durability and flexibility. It is desirable, also, that the material have a low density.

To this list of stringent requirements there have been added recently additional ones created by the increasing altitude of military aircraft operations. For pressurized cockpits and cabins, shatter-resistant (or armor) glass becomes significant. Laminated plastics provide one answer to this problem.

► **Absorbing Fluorescent**—Spectral energy distribution of solar radiation is regularly changed by the absorption of the atmosphere. Clouds reduce the ultraviolet and infrared visible radiation, while oxygen, water vapor and carbon dioxide change the spectral distribution in the infrared. At high altitude the effect of solar radiation on personnel must be considered.

Protection from ultraviolet radiation is vital on long missions and reduction in infrared energy would be achieved as a substitute for refrigeration. Ultraviolet absorbing plastics have been available and the recent introduction of a new class indicates progress in the solution of this problem.

► **Fluorescent-Superconductive**, on which the infrared energy absorbed in temperatures, must be placed with transparent

materials of increased heat resistance. This problem of heat stability is considered to be most urgent.

Another requirement which becomes significant is the electrical insensitivity of extreme surfaces. The accumulation of static electricity on surfaces which have no leakage path causes disruption of radar and radio contact.

Little significant progress has yet been made on this problem for transparent plastics, although related work is being sponsored by Navy Bureau of Ordnance.

Most plastics research and development is undertaken by industrial laboratories on their own. Other plastic work is done by academic groups and research institutes, with or without government sponsorship. It has, therefore, been deemed necessary for the Air Force to sponsor research work in the direction of a transparent material suitable for glazing supersonic aircraft.

► **Material Selection**—First decision with regard to each project is whether the goal will be a thermoplastic or a thermosetting material.

If the heat resistant material is thermoplastic, fabrication may be accomplished by forming at temperatures above the required service temperature. If thermosetting materials are utilized, it will be necessary to fabricate desirable curvature parts, such as canopies, by casting in the final shape. Since the required molds are processes are not available, such a program would have to include their development. The Navy Bureau of Aeronautics is working on this approach to the problem.

► **Formed Air Force** effort is towards development of a suitable thermoplastic material. Current models at the fastest commercial military aircraft have used glass, while others have used plastics. Actually, there has not been any plastic failure due to speed or to heat produced by speed.

Research has indicated that considering future aircraft speed, the use should be temperatures of 350-400 F in order to achieve them within several years. However, it has been decided to develop a material suitable for use at 250 F as an interim step in the program.

► **Contract Progress**—First contract has been awarded to the General Aniline & Film Corp., currently first work on methyl methacrylate.

This material appears to offer definite advantages, over currently available materials, with respect to heat resistance. Coupled to methyl methacrylate, the

index of refraction is 1.52 as against 1.48; density is 1.65 compared to 1.18, and heat distortion temperature is 250 F compared to 208-210 F.

Contract work has progressed along two major phases—preparation of monomers and casting of sheet plastic. Six methods of preparation have been studied. Of these, it has been found that dicyclohexylmethane by means of methanol, by sodium acetate and by sodium bicarbonate show most promise. Evaluation has been based on ultraviolet spectral absorption, initial color and heat distortion temperature.

The details of monomer preparation are considered very significant in the attainment of a viable, reliable product. Although high quality materials have been frequently obtained, complete control of most factors not yet related will be necessary to achieve a material of reproducible stability.

A more complete understanding of the chemistry of the plastic may result from studies in thermal decomposition now in progress. Results of these tests will also be significant in relation to high temperature behavior.

Second phase of the project has been concerned with casting of the sheet plastic, without compensating its properties.

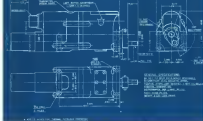
► **Evaluation Factors**—Refraction of flux and deflection to transparent film optical transparent plastics indicates that above the 185-200 F range for constant cast synthesis there are perhaps three different categories of materials in the range 250-350 F. One of these is the present material, while the others are the result of independent selected research.

When typical sheets of the present material are available for comparative tests, more will be known about the actual progress toward the goal of a heat-resistant and transparent thermoplastic.

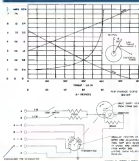
The development of a suitable application method for evaluation of heat resistance is a problem closely related to development of the material itself. The traditional heat distortion point, which reduces thermal deformation under certain time and temperature conditions to a single number on a temperature scale, is inadequate but is still widely used. It has been proposed to supplement this point with short time creep data for a given load at a fixed temperature applied in relation to the heat distortion point.

In the field of metals, stress-rupture tests have been used for the evaluation of materials which, under stress, but which must not rupture in relatively short time service. For each temperature of interest a series of tests is made over a range of stresses selected to cover rapid

(Continued on page 31)



MODEL R-174



MODEL R-220

**Trim Tool**  
Strongest, Simplest, Lightest System of  
**TRIM TAB CONTROL**

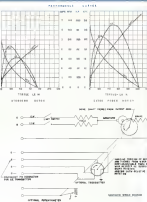
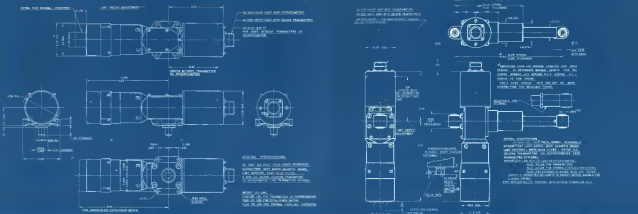
**AIRBORNE**  
ACCESSORIES CORPORATION  
25 MONTGOMERY ST. • HILLSIDE 5, NEW JERSEY

BRANCHES IN CHICAGO, NEW YORK, LOS ANGELES, PHOENIX, SAN FRANCISCO



We suggest you investigate the advantages of the "TRIM TOOL" principle for your current designs.

Based on a model drawn by W. E. BROWN, Air Material Division, Wright-Patterson Air Force Base, before the Plastic Division presented by the Society of the Plastics Industry, Washington, D. C.



## ROTORAC

### Right Angle Rotary Actuator

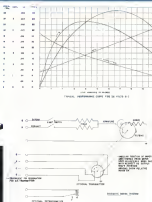
#### MODEL R-118

**VERSATILITY**  
The right angle take off permits location in tight spots without compromising compact design.

**Available for 110V, 60 Cycle, Single Phase A.C.**

**AIRBORNE**  
ACCESSORIES CORPORATION  
25 MONTGOMERY ST. • HILLSIDE 5, NEW JERSEY

PRINTED IN U.S.A.



## Lineator

### HIGH EFFICIENCY Linear Actuator

#### MODEL R-144

**HIGH LOAD CAPACITY  
WITH LOW WEIGHT**

**Available for 110V, 60 Cycle, Single Phase A.C.**

**AIRBORNE**  
ACCESSORIES CORPORATION  
25 MONTGOMERY ST. • HILLSIDE 5, NEW JERSEY

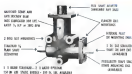
PRINTED IN U.S.A.



MODEL R-300  
TWO-WAY



MODEL R-310  
THREE-WAY



## ANG Gear

is a standardized  
right angle gear  
unit for aircraft  
and industrial  
applications.

SALES OFFICES:  
4924 MELROSE AVE. • HOLLYWOOD 38, CALIFORNIA  
N. N. WRIGHT • DALLAS, TEXAS  
The E. W. Hughes Owens Co. LTD. • OTTAWA, CANADA

hours over time proceeds from a few hours up to several thousand hours.

Plating such data may prove useful in the field of plastics. It is planned to accumulate data on various plastics.

Lawrence Stadel-Wick is also in progress on establishing a suitable method for determining the ignition temperature of plastics. Recent difficulties with regard to the acrylic laminates have necessitated an investigation of the interlayer and the plateboard used. Requirements for greater heat resistance in the interlayer plastic used in laminated glass indicate that further development is required.

It is interesting to note with regard to the problems of proposed heat resistance in plastics that independent conduct surveys show that this property is desired by many but few customers will pay for it.

Considering the Air Force as a customer, it is anticipated that the amount of heat-resistant plastic required will probably be small for some time. It is the conviction of this commercial aviation that has found the Air Force to sponsor its own research and development program. Progress in these areas, however, will probably lead to further development in the entire field of transparent plastics.

## ENGINEERING FORUM

### Divergence Data

The article "Wing Divergence: Design to Post Flight," appearing in your Dec. 19, 1949, issue is a well-written description of a difficult technical subject. It tends to be used primarily as information gathered at the NACA. I found two faults with the article, which, however, do not detract from its general usefulness.

1. The section is made that wing divergence is hardly ever an important condition in practice unless the wing is swept forward, or unless external forces such as fuel tanks, engine pods, etc., are located at outboard stations of the wing with their aerodynamic centers well forward of the wing elastic axis.

2. Hunsen's (NACA) method is given credit in the first paragraph and accounts therefore designed for taking into account the effect of load on airframe elasticities. This is not correct. Hunsen's (NACA) method, listed as reference 11, was published more than a year in advance of Hunsen's method and still is not more widely recognized than the simple industry technique. Hunsen's report also ignored wing divergence and wing-torsion divergences which were not considered as Hunsen's report.

Lee Smith,  
Chief, Structures Branch,  
Aircraft Laboratory,  
Air Materiel Command,  
Dayton, Ohio

AVIATION WEEK, January 23, 1950

## engineer's notebook



### FOR HANDLING SHOCK LOADS

Secure overflow cylinder to landing gear shimmy damper with Marmen T-bolt damp, especially suited to severe shock loads encountered in this installation.

### JET ENGINE JOINT CONNECTIONS

Marmen V-Bond couplings provide an efficient seal and facilitate maintenance with quick disconnect provisions of the coupling latch.

### FASTENING OXYGEN BOTTLES

Molding straps and clamps meet withstand a resultant force in any direction of 3500 lbs. Standard Marmen types fulfill all requirements and can be adapted to any specific design.

Save cost and design time with Marmen

FOR INFORMATION WRITE: REPUR-1  
THE BEST CLAMPS, STRAPS AND COUPLINGS

**MARMAN**  
PRODUCTS CO., INC.  
140 WEST FLORENCE AVE.  
INGLEWOOD, CALIF.



**AIRBORNE**  
ACCESSORIES CORPORATION  
25 MONTGOMERY ST. • HILLSIDE 5, NEW JERSEY  
BULLETIN 111





# 90% OF JET AIRCRAFT MANUFACTURERS USE Refrasil HIGH TEMPERATURE, LIGHTWEIGHT, INSULATION

B-36 Largest Bomber

F-86 Fastest Record

XF-85 Smallest

BOEING B-47

GRACE VOUGHT F-4U

CONSOLIDATED B-34, B-36

LOCKHEED F-80

MARTIN B-26

MC DONNELL 37-45

NORTH AMERICAN F-86, B-45

ORTHOPY F-40

DOUGLAS D-558-1, D-558-2, F7-30



Typical covered blanket construction for full case of Jet Aircraft. Smaller narrow blanket as used on tubular case.

**REFRASIL** is high temperature, lightweight insulation. Withstands sustained temperatures up to 1800°F. and flashes up to 2400°F. Easy to install and remove. This hard to beat combination makes **REFRASIL FIRST** in the Jet Aircraft Insulation Field.

Eastern Rep  
1941 W. Ashland  
1342 Highland Road  
Baltimore 14, Md.

In Seattle  
2 Lawrence Avenue  
2016 Robert Place  
Seattle 10, Washington



**The M. L. THOMPSON CO.**

Dept. A, 1793 Commerce Street  
Los Angeles 7, Calif., U.S.A.

for a gas gives him a fresh start by using the "jet fighter override" switch. This switch also permits the pilot to skip starting procedures. He has only to push the handle to start the engine.

The turbine is designed for speeds up to Mach 4 and can operate at 500 deg. acceleration about three times. Wind velocities up to 110 mph—double the maximum available in previous turbofans—can be introduced into flight problems.

■ **Mining.** Troublesome equipment features of the Landrover in the 12-man groy (bag) vehicles controlled by the instructor. These permit the instructor to feed to the learner such simulated troubles as engine failure, engine fire, engine overheat, fuel pump failure, low fuel pressure, hydraulic system failure, hot turbine, foreign body pasteurizer, pilot and wing ice, and lightning.

■ **Navigational.** Navigational facilities in the cockpit include a radio magnetic indicator, distance measuring equipment in ID-249 counter-pulsed indicator and an arbitrary course computer. These enable the pilot to determine his position and course through visual reference to instruments, radio signals, through radio signals in the case with direct, low frequency equipment. Low frequency controls are provided, however, for radio compass and windmill products.

The instructor's console has two station locations with all controls necessary for setting up type of station, frequency, call letters, maximum range and approach bearing. By setting Station No. 1 at Station No. 5 at once, the pilot has turned to Station No. 2, the instructor can simulate an infinite number of radio stations and make possible simulated cross country flights of more than 100 mi.

A complete record of the pilot's flight path is maintained by a new type of electronic recorder, also located at the instructor's station. This uses a true ground path on a real 22 sq. mi. radio direction finding chart. The instructor can give ILS or GCA (ground practice).

■ **The "Ruse."** The electronic system which translates every act, or failure to act, on the part of the pilot into return current and control messages, constantly provides of 24 computer-based in very reasonable cabinets and draw-out type panels at the back and end of the trainer. Each channel unit can be completely removed for maintenance by hand-screwed hinges and quick-disconnect plugs. In all, this system has 242 tubes and over 8 miles of wire.

One advantage of the C11 is that it can be split up into four sections small enough to pass through a 3 ft. 6 in. door. Sections are mounted on rubber wheels. As a unit the C11 is 14 ft. long, weighs 1750 lb. and occupies less than 300 sq. ft. of floor space.

## FINANCIAL

### Market Action

(Listed Airline Common Stocks)

Company	1945-46 High	Dec. 31, 1945 Close	Dec. 31, 1949 Close	% Gain 1944-1949
Alaska	42	41	41	—
American	19	7	94	411
Boeing	47	64	8	17
Capital	39	64	94	45
Chic. & Southern*	36	51	7	21
Continental	45	46	46	—
Eastern	37	344	144	11
National	41	5	74	47
Norfolk	25	24	24	—
Northwest	63	94	114	24
Pan American	29	44	94	9
TWA	79	14	17	62
United	62	104	114	25
Western	43	5	8	33

\* Voting trust terminates

## Airline Shares Stage Comeback

Increased traffic and more mail pay strengthen most carrier's equities. Small minority shows declines.

Airline equities, reflecting improved earnings and a more favorable outlook, finished 1949 at virtually new highs for the year. This market extension for airline shares also pulled over into the circles weeks of 1950.

The completion of a calendar year is generally stated upon as a benchmark in evaluating progress of the past period. It would be more proper to measure results of any given cycle in terms of time period of interest significant to those engaged in the small investor's selling at year-end. In this instance, an annual conference is present at that airline shares, as a whole, started the year at virtually their low and concluded the year at their peak.

■ **Mail Freight.** Airline stocks reflect strong growth characteristic in the needs of operators and investors alike and for that reason continue to possess glamour in market transactions. Further, the group has been severely deflated from its 1945-46 price peaks, that there are always hopefuls who expect a recovery back to the old highs. On the other hand, there have been many indications of a lack of follow through in the past on airline shares, that a great deal of skepticism has also been developed.

In the final analysis it is earning power or the hope of earnings which is the basis of the entire level of market quotations. The market place is an arena where informed opinion backs its conclusions with cash. In effect, this makes the trend of air prices nothing more than a barometer of earning events.

Actual earnings reports spelled the reverse of market prices for individual issues throughout the year. Improving profits, generated by increasing traffic plus together with some mail pay earned away previous interest results to black. As a splintered asset record was marked by unfortunate cycles and some confusion centered from the possible comprehensive possibilities of air cargo services, airline equities backed up slightly as the industry entered the final stretch of 1949.

The expectation that business was going to improve further, aided by result of the transportation trade, helped boom airline shares into 1950.

TWA, with the maximum price upper ceiling for 1949, actually reflected its strong recovery in earnings together with its sub-optimum position in handling from the attempted peak, noted to Rome this year as a result of Holy Year.

National, showing a market appreciation of some 47 percent during 1949, reflected itself from market's depressed condition as well as from improving operations. Late in 1948 National was still being played by its pilot's strike and CAB declassification proceedings.

Settlement of the labor controversy and the passed controversy dealt with Pan American Airways have aided the company's outlook.

Capital's sharp recovery of some 45 percent in the market price of its common stock, equity basis, however, is the transformation of this property into a profitable airline. A genuine recovery in operations, largely as a result of its own planning together with a retroactive mail pay award, solidified the company's financial status as a complete recognition of its debt structure was partly liquidated.

Colonial Airlines shows a price decline of about 27 percent at the present. The carrier's difficulties in having Canadian cooperation granted its route from Montreal to New York is believed largely responsible for this market action.

■ **Rail Decline.** A portion of the year trend in airline common stock decline (1949) during the year. Much of this decline can be attributed to the apprehension among investors as to the possible auto-liquidation of competitive strength from the proposed air-rail pact between National and Pan American.

Lack of unanimity among the price movements of airline equities reflects outstanding opportunities for active shifts. In retrospect, an investor would have profited handsomely by catching five Capital into Capital at the same price level.

Rarely has the same selection pattern of the past been repeated in the future. Separate events influence individual price movements along with the broad industry trend. Now it is wise to anticipate that the optimum price levels established during 1945 and 1946 will soon be surpassed.

For the ultimate benefit of an investor stock price movements, continuing approval of airline earnings must be maintained. It is in such tangible proof of advance that investors can be built to support market values with any degree of confidence.

—Selig Altschul

L. J. WARD  
Vice PresidentE. R. VITECHELL  
Vice PresidentJOHN B. GINNELLY  
PresidentA. W. JOHNSON  
TreasurerW. BARRY BARNES  
Chief of Engineering

## SOUTHWEST AIRWAYS USES DEPENDABLE

CHAMPIONS IN WINNING TWO CONSECUTIVE  
NATIONAL SAFETY COUNCIL AWARDS

From its first take-off in December, 1945 to the present, with about 60 million passenger miles behind it, Southwest Airways hasn't had an accident. Under normal circumstances that would be record enough, being a feeder line operating on 33 cities and four towns averaging 43 miles apart from Meridian, Oregon to Los Angeles, it is a truly outstanding achievement. The National Safety Council gave Southwest its first two Aviation Awards.

Southwest is famous for the short time

it spends on the ground between landings and take-offs - they average about six minutes, sometimes stop-start in one minute. But the extraordinary stress on spare plugs from frequent use of full-throttle and sound taking and engine idling is mostly against Southwest, however. Its most common, even Champion Spark Plug and reports them completely dependable. Their fine record bears out this statement.

CHAMPION SPARK PLUG COMPANY, TOLEDO 5, OHIO

R4-L  
Standard Type

## FOLLOW THE EXPERTS

USE CHAMPIONS AND FLY WITH CONFIDENCE

DEPENDABLE

CHAMPION

SPARK PLUGS

## AIR FORCE CONTRACTS

## Awards of Less Than \$100,000

Following contracts for less than \$100,000 were awarded by the Air Force in November. List of contracts to exceed \$100,000 appeared in Aviation Week Jan. 16. Estimated completion dates are indicated.

**AC Search Fire Detector, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**A-1 and A-2, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

**Acoustic Searcher, General Electric Corp., Pitts., Mass.** for complete development and test of fire detector for aircraft. Estimated completion date, Jan. 1947.

Electrode	Source	Co.	Product	140
-----------	--------	-----	---------	-----

[illegible]

© 2000 Blackwell Science Ltd *Journal of Internal Medicine* 247: 399–405

Anal. Calcd. for  $C_{10}H_{10}O$ : C, 88.10%; H, 7.41%. Found: C, 88.1%; H, 7.4%.

DOI: 10.1002/anie.201100000

and compensation. This is the case of employees and contractors. For



VHF Transmitters • H. F. Transmitters • Radio Control Panels • Antennas • Indicators  
Automatic Radio Composites • Marker Beacon Receivers • Resonating Systems  
VHF Communication and Navigation Receivers • Inter-Communication Systems  
H. F. Receivers • Radio-Magnetic Indicators • Ground Controlled Approach Landing  
Systems • Nightlight Personal Plane Radio • VHF Omni-Directional Range Systems



NEW YORK CITY

Whatever the Plane or Purpose . . .

**Bendix Radio**

**...and still we're seeking  
final answers!**

You can't sit on your hands in the aviation business. The phenomenal growth of the industry has come from its inherent belief that "there is always a better way". That is why Bendix Radio devotes as much time and thought to future products as to present production. And results have amply proved the wisdom of this policy. Basic advancements in VHF and

VHF radio, and in GCA, in omni-directional equipment and other navigation aids, have firmly established Bendix Radio as the leader in thinking as well as doing in its highly specialized field. If you are looking for the latest in airborne or ground radio equipment, better check with Bendix Radio. After all, it's just good judgment to look to the leader for leadership.



One of the world's fastest planes—the B-29 Superfortress—in which Bendix Radio research engineers flight-test every new idea in modern communication and navigation.



**PERFORMANCE**

Every new step along with us Bendix Radio communication and navigation equipment is achieved based on flight performance under every conceivable flight condition in all parts of the world.



**RELIABILITY**

By the time a Bendix Radio system is installed, it is a single reliable unit. No type of installation, no type of maintenance—Bendix Radio Radio is complete line of service units.



**ECONOMY**

For the same reason Bendix Radio Radio is a single reliable unit. No type of installation, no type of maintenance—Bendix Radio Radio is complete line of service units.



**ADVANCED DESIGN**

In the same reason Bendix Radio Radio is a single reliable unit. No type of installation, no type of maintenance—Bendix Radio Radio is complete line of service units.

**is the Choice**

BENDIX RADIO DIVISION of  
SAATCHI & SAATCHI

Radio Sales Bendix International Division,  
22 RIV. Avenue New York 21, New York



*P.S. Our VHF Omni-Directional Range Navigation system is a fine example of what's new in aviation radio. Write for booklet and get up-to-date on this great development.*

rishted. Transportation, address in Dept. of Transportation, Washington, D.C., 20590.

**ACA-Vietnam (Hondai),** South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110. **ACA-Vietnam (Hondai),** South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

**ACA-Vietnam (Hondai),** South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

**ACA-Vietnam (Hondai),** South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

**ACA-Vietnam (Hondai),** South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

**ACA-Vietnam (Hondai),** South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

**ACA-Vietnam (Hondai),** South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

**ACA-Vietnam (Hondai),** South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

**ACA-Vietnam (Hondai),** South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

**ACA-Vietnam (Hondai),** South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

**ACA-Vietnam (Hondai),** South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

**ACA-Vietnam (Hondai),** South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.

ACA-Vietnam (Hondai), South Corp. of America, Vietnam, P.O. Box 1000, Saigon, Vietnam. Tel. 110 110 110. Fax 110 110 110.



SMULATED CONSTELLATION BAGGAGE COMPARTMENT used in CAA's test program at Indianapolis is shown heated up to various types of visual smoke.

## Smoke Detector Value Weighed

New type visual device, and sniffer type being studied as possible replacement for former models.

By Charles Adams

Whether the airlines should agree to require to install smoke detectors on all their planes as a protection against cargo and baggage compartment fires, or whether the industry has such a device in the future, the Civil Aviation Board is studying the matter.

Early in 1945, after the smoke detectors forced in hundreds of false alarms, CAA proposed a standard to discontinue the device. Since then, about 30 percent of the airlines' planes have carried detectors under a test program conducted in cooperation with CAA.

National Board of Standards and Manufacturers of the device.

First-Fit Phase—CAA, which has been carrying out an extensive cargo and baggage test program at Indianapolis, is now in the final stages of the work. A report is expected within 60 days. After that, CAB may consider new regulations. Late phases of the research work will include additional tests to determine the feasibility of fire control by sniffer type, to determine construction and layout of sniffer, positive maintenance, and to evaluate the use of sniffer as an extinguishing agent.

Indefinite use will be made of using a simple "sniffer" tube as a cargo compartment.

direction on panel at left center, to remove air movement and blowing at corner, so to photoelectric type smoke detector and smoke density sensor at right.

## Smoke Detector Value Weighed

New type visual device, and sniffer type being studied as possible replacement for former models.

By Charles Adams

Whether the airlines should agree to require to install smoke detectors on all their planes as a protection against cargo and baggage compartment fires, or whether the industry has such a device in the future, the Civil Aviation Board is studying the matter.

Early in 1945, after the smoke detectors forced in hundreds of false alarms, CAA proposed a standard to discontinue the device. Since then, about 30 percent of the airlines' planes have carried detectors under a test program conducted in cooperation with CAA.

National Board of Standards and Manufacturers of the device.

First-Fit Phase—CAA, which has been carrying out an extensive cargo and baggage test program at Indianapolis, is now in the final stages of the work. A report is expected within 60 days. After that, CAB may consider new regulations. Late phases of the research work will include additional tests to determine the feasibility of fire control by sniffer type, to determine construction and layout of sniffer, positive maintenance, and to evaluate the use of sniffer as an extinguishing agent.

Indefinite use will be made of using a simple "sniffer" tube as a cargo compartment.

CAA investigations have led to tests up a single instance in which a fatal accident was traced definitely to a fire in flight requiring its baggage, although there have been cases where passengers reported directly in their cabins. On the other hand, there is the case of the United Air Lines DC-6 crash near Mt. Carmel, Pa., on June 1948, when a false fire alarm apparently caused the death of 41 persons.

One of the DC-6 was investigated as a result of a concentration of carbon dioxide gas which seeped into the cockpit after investigation was directed to the forward glass pit to another passenger.

Plane builders believe fire protection can best be obtained in the future by installing baggage compartments and having them with fire resistant materials. It is contended, however, that adequate sealing of compartments and smoke detectors would be difficult and expensive.

Visual Detectors—For the past few months, CAA tests have included experimental work on new-type visual smoke detectors, which have been provided in prototype form by Walter Kohler & Co., Bethesda, N. J., and CVO-Two First Equipment Co., Newark, N. J.

During a recent meeting at Indianapolis, in which CAA reported on the progress of its baggage compartment fire test program to representatives of the National Board of Standards and Manufacturers of the device, it was agreed that the visual type smoke detectors (already in use on ocean vessels and aircraft) holds the most promise for visual type detectors because of their ease of installation and their ability to give comparisons to the instrument panel. On the panel, at the end of each tube, at a glass window, has a light which is a light that is visible until foreign matter such as smoke or dust particles enter the tube.

Disadvantage with this type detector is the possibility that the light reflected by the smoke particles would be of sufficient intensity to attract the pilot's attention. As a result, in an emergency with the manufacturer, CAA has undertaken responsibility not only for increasing light intensity but for improving the field of view, decreasing smoke reduction and providing means of fire indication.

After the improvements are made, at least three of each type detector will be provided for experimental testing by the National Board of Standards and Manufacturers of the device.

Sniffer Type—CAA has also agreed to investigate the possibility of the sniffer device, which could eliminate any fire



### Kidde Visual Smoke Detector

This new visual type smoke detector, built by Walter Kidde & Co., and new "enduring" light bulb, is designed to prevent nuisance in the cockpit of an aircraft any one of four compartments in an aircraft.

Construction of the detector is such that no light is visible through any of the four ports even at night unless there is smoke within the housing to reflect the light. If smoke is present, a white light is seen within the chamber through the view port.

► **Sensitivity Increased**—A feature has been built into the detector so that the light flashes on and off. This feature increases the unit's sensitivity and gives a better warning. The flasher action can be shut off by passing the flasher control switch at the bottom of the face plate, thus allowing a more detailed inspection to be of visual smoke conditions.

► **Visibility**—The adaptable light in detector consists of a detachable view port covered with an adjustable rubber part. When the ports are so high, the detector light is visible. By turning the rubber adjusting plate counter clockwise, the intensity of the indicator light is reduced.

the usual type detector. The indicator type would consist of a single duct system between the compartment to be protected and the cockpit. It would be designed to permit detection of fire by color alone. With respect to extinguishment, both in cargo compartments, CAA has indicated that carbon dioxide is not effective unless the air change rates are kept above one-half change per hour, which would require constant testing. When testing is accomplished to such an extent that the air change rates are near zero, it appears that a fire can be self-controlled by lack of oxygen.

ing the cockpit can be cut down to zero. This is for the convenience of pilots who desire varying degrees of indicator light intensity.

The unit has four separate inlet ports, one for each view port or each test chamber, and one exhaust port. These are located in the rear of the unit. The strongest port is for smoke/heat sampling from four compartments, one test chamber being used for each compartment. In the case of a two-compartment aircraft, two test chambers can be used for each compartment. An A/N electrical connector is located at the rear of the unit.

► **Back Replacement**—Front face plate containing the four view ports can be removed by loosening the fasteners. This permits the face plate to be pulled out but not completely disengaged. After the face plate has been fully extended, it can be lapped down to a position where the light can be removed from the cockpit and replaced in flight if necessary.

The detector has been designed for universal mounting and can fit in a standard instrument panel. Normal mounting in the instrument panel would be with the four mounting screws shown.

### Recommend TCA Foreign Permit

Recommendation that Trans-Canada Airlines be granted a foreign air carrier permit to operate from Montreal and Toronto to Fort de Sade, Tinselt, via Tampa-St. Petersburg, The Hague, Amsterdam, Kopenhagen, London, and a point in Barbados has been made by Civil Aeronautics Board Executive R. Vernon Radcliffe. TCA was designated by the route by the Canadian government in accordance with last year's air transport agreement with the U.S.

## Super-Feeder

Monarch - Challenger  
may acquire Arizona  
Airways routes.

The Back Mountain and's super feeder is rapidly coming into shape.

Management negotiations for the consolidated operations of Monarch Airlines and Challenger Airlines were recently announced by H. S. Day, president of the merged corporation. Concurrently, Civil Aeronautics Board Executive R. Keith recommended approval of Monarch's proposed acquisition of a second feeder, Arizona Airways.

► **Seven States**—CAA approval of the Monarch-Challenger merger last Dec. 16 gave the combined system more than 7000 route miles extending from Denver to Salt Lake City, Billings, Mont., and Albuquerque, N. Mex. Addition of Arizona Airways' system would bring total route mileage to over 4000, with service provided to seven states and around 50 communities.

In endorsing the Monarch-Arizona merger, Executive Keith said the two which probably represents the most independent means of achieving Arizona Airways' long-desired route. Arizona was designated for a certificate in February, 1946, but was unable to raise enough money to inaugurate service along the route.

Consolidation of the Monarch and Arizona routes would result in a reasonably integrated and coordinated system, Keith declared. He added that the price to be paid by Monarch for Arizona in fact no money would be created and no other air carrier would be injured substantially.

► **Extensive Request**—Executive Keith argued previously for separation by Monarch of all Arizona's outstanding stock in exchange for 6000 shares of Monarch's stock and money due by Monarch of \$170,000 to Arizona's creditors. Separation of the feeder system at present day rates was, Keith evidenced a request that Monarch be granted a 120-mile route extension from Gallup, N. Mex., to Arizona Airways' northern terminal at Winslow, Ariz.

The merger agreed that the merger would probably result in higher traffic loads than that of the companies operated separately. He said that expansion under the consolidation should be less than what is independent status, and that any requirements should be decreased by the action.

In setting forth conditions for approving the merger, Keith urged that CAA withhold issuance of the new cer-



from "Connie to Cub..."

AIR CARRIER'S NEW HANGAR

serves 'em all!



**NOW** is our new location situated strategically on the mile North South highway and with 4 times the working area.

ACES is prepared for overhaul jobs on any type and size of transport plane. 75 years of Pratt & Whitney know-how are behind every overhaul job undertaken. Though we are P & W "specialists" our top flight mechanics know every type of engine backed by latest test and overhaul equipment!



**COMPLETE SERVICE COVERING 124,000 SQ. FT. OF OPERATIONS**

- ENGINE OVERHAUL
- ACCESSORY OVERHAUL
- ACCESSORY EXCHANGE
- BLOCK TEST
- ENGINE SALES
- ENGINE INSTALLATIONS
- ENGINE EXCHANGE
- START PARTS SALES

**AIR CARRIER ENGINE SERVICE, INC.**

C.A.A. Approved  
Repair Station No. 3404

CABLE  
"ACENGIN"

P.O. BOX 1285  
MIAMI, FLORIDA

## BETTER! FASTER! CHEAPER!

An Exhaust System . . . a Complete Power Package — ROHR builds these and other products for such famous names in Aviation as Boeing, Convair, Lockheed, North American and many more. ROHR'S proven production skills, equipment, engineering ability and experience are available to you, too. When it's made of metal . . . and you want it better! faster! cheaper! wire, waste or telephone ROHR.



ROHR-built power package for the Lockheed Constellation.

# ROHR



## ROHR

AIRCRAFT CORPORATION

in Chino, Calif. • 7 miles from San Diego

One of the many ROHR-designed drop hammers now in operation at ROHR.

inspired east Moush shows it has adequate financial resources to operate the consolidated system.

Moush President Durr believes CAB will uphold the examiner's findings and approve the Airman Design program shortly. CAB has wanted to experiment with a super-fueloline for some time, selecting Pratt & Whitney for that purpose in 1947 and 1948. But Pratt was unable to deliver its more than 4000 miles of subsonic short-hand scater, and therefore its late to other design is now under consideration.

► **New Staff Assignments**—Monsieur is president and active head of both Moush and Challenger. Durr has announced new company assignments:

R. M. Wilson, formerly executive vice president of Moush, will be vice president-operations for the combined system, and Donald A. Durr, formerly president and board chairman of Challenger, will be vice president-finance, sales and public relations.

May F. W. Baskin, board chairman of Moush, will retain his position and financial interest. C. A. Myler will be treasurer and administrative assistant to President Durr.

## Flashing Lights For Night Flights

New rules requiring flashing lights on all night-flying aircraft are being considered by the Civil Aeronautics Board's Bureau of Safety Regulation.

Under current operating requirements, only scheduled airline transports are required to have flashing position lights. Other planes must have steady position lights.

Both CAB and the airlines feel that danger of collisions under night VFR conditions will be reduced by the proposed new amendments to Parts 41, 43, 45, 50 and 61 of the Civil Air Regulations. Specifically, the new rules require installation of a flashing device on all aircraft and use of a two-color flashing position light system approved by the Civil Aeronautics Administration on all civil aircraft of 12,500 lb. or more maximum certificated takeoff weight, regardless of how they are used.

► **Small Plane System**—The single nearest system required on small aircraft consists of three lights: red on the left wing, green on the right wing, and white on the tail. The two-color system is a night-light system, in addition to the three lights above, a white light on the top and bottom of the fuselage and a red light on the tail. These last three lights will flash alternately with the wing lights and white tail light on all planes of 12,500 lb. or more maximum certificated takeoff weight.

CAB and it had considered the cost of the required new equipment and decided it is negligible in view of the increased safety to be achieved. Inquiries by the Board disclosed that at least one accurately simple flashing device for small aircraft costs between \$1 and \$4. Cost of the installation for large aircraft is considerably higher.

► **Military Converting**—Incidents of the flashing light equipment on Part 61 of the Civil Air Regulations would require all military and foreign aircraft, in addition to U. S. civil aircraft, to display flashing lights. The armed forces have been converting their planes to a flashing light system, and all military aircraft will be so equipped in the near future.

Comments on CAB's flashing light proposal must be submitted by interested parties to the Board's Bureau of Safety Regulation by Feb. 1.

## CAB Reports On Alaskan Crash

Pilot's action is going off the designated array at an altitude insufficient to clear the terrain probably caused the Alaska Airlines accident near Homer, Alaska, Jan. 28, 1949, in which five occupants of a DC-3 were killed.

In issuing its official report on the accident, the Civil Aeronautics Board said that the plane, flying at clear weather, crashed into a tall pine ridge cut of the center line of the runway to Kona. Contributing cause of the mishap, the Board continued, was the failure of the Alaska Airlines' dispatcher to act when the pilot of the carrier's plane announced his intention to proceed VFR from Homer to Kona.



STRATOCRUISER'S FOLDING TAIL.

United Air Lines, which recently closed its Stratocruiser service between the West Coast and Hawaii, said the tail-folding feature on the new Boeing was handy. At its full height of 11 ft., it is, the tail would be into nothing but thin a drizzle large, UAL says. But as its tail is 28 inches the vertical distance and safety can be added over to reduce the height to 10 ft., it is, allowing the tail to fly through most baggage doors. Top, left: mechanics get job to fold tail down, right: towing operation starts, below, with tail folded, Stratocruiser can save baggage.









## LETTERS

### Copter Financing

Your comments on the editorial page of the January 5 issue of *AVIATION WEEK*, under the byline of "How to Finance the Helicopter," discuss a topic close to our hearts. On finding your editorial I recall 1941 and 1946, and again in 1947, when my young engineers, budgeted into office after office looking for (let's not) some bright ideas. As you know, great for working capital to keep our developments through production, created us from start to coast. Whether in New York, Chicago, Los Angeles or San Francisco, the action was still the same.

In certain respects, I guess we had no time to finance capital ourselves, after all, we were young, the product was young, and there was our government. All we had to show was a few modest pictures and other tangible information on our past helicopter development. There was another factor which we learned from the accounts of those who should know. As I signed what have it, it is different now than 21 years ago. The efforts of venture capital have flourished and disappeared.

Confronted with this indifference, not only with the problem of not being able to raise adequate working capital through seed and accepted channels we carried our financial problem to the small aviation of southern California. Through personal appeals and personal contacts, we were able to raise over \$1 million. As far as we know, the money invested in that helicopter today is the only public equity financing of its kind in the aviation field since the war. United Helicopters, Inc., a California corporation, has over 4100 stockholders, the greater majority of whom are located in the immediate San Francisco Bay area.

Yes, some of the skeptics were right— it was a risk and we have lost it, but have we really lost? In fact, we gained to the extent of not being as much as might have been expected. We have experienced a going production line and a world wide network of sales and service, with a product proven in practically all fields of industrial and governmental aviation.

How to promote a helicopter? That is a recurrent question which only time can tell.

BRANDEN HILLER, Jr.,  
President  
United Helicopters, Inc.  
1970 Midway Road  
Folsom, Calif.

### Unhappy Stockholder

I would like to comment on your article, "How Far Is the FAA/ADA Deal?" as you see the 12 issue. First let me say I am the owner of 75 shares of American Adair common stock bought at \$100 in 1945.

According to the 1945 ADA annual report, the stockholders of ADA were notified by letters dated Jan. 15, 1949, that on Dec. 15, 1949 the company had received an

agreement with the Aviation to sell American Adair common stock to FAA. Under the deal each share of the stock was paid, that was the last notice the stockholders had that their company was to be sold.

The only notice I received, as an ADA stockholder, was in the 1949 annual report received in 1949. An American Adair is the majority stockholder in ADA and as it has been said that ADA is the only subsidiary of AA that operates at a profit, it would seem to me that the AA stockholders should have an opportunity to vote on the basis of the stockholders. The stockholders of AA have had no chance to vote on it. I am enclosing the AA annual stockholders notice of meeting for May 13, 1949, and you will note that it does not say anything as to the proposed sale.

I attended that meeting but thanks to my plane being a hell hole line I did not arrive until 11:30 a.m. as I was told the meeting was over and all the business had been transacted. I was not given a minute of what had taken place.

The report of the meeting sent to the stockholders was an outrage in that it did not tell a single thing that had occurred at the meeting. All it stated was that the board of directors had been so directed. So much so that a stockholder of American Adair knows absolutely nothing about how the company is being run except what he reads in the paper or gets out of the annual report.

Mr. R. S. Etkin has said the deal was made in secrecy, in view of the above, I agree with him.

I wrote to the CAB objecting to the deal and in reply I received a letter from Mr. O. Cook, the CAB director, advising me to have an attorney present my objections. I am led to wonder if the attorney comes in to help to present his views without response or merely if it is to be one more costly endeavor like CAA and CAB decisions take so long. If they would allow the law to be used, it would be a great advantage. I will advise a lot later than it has at the last date.

Let me comment further on the AA stockholders meeting. I attended. The kind of discussion poor cooperation by the directors. I believe there were only a couple of them there.

I asked C. R. Smith after he was going to deal each share and his reply was that there wasn't enough data and that would remain later that it was a going proposition. This was the man who wrote the article for the "Aviation Previews Plan" as titled, "What American Adair is a Good Adair." Now the new after May 13, 1949, the deal has been made and the stockholders have been informed. I believe the deal was made in secrecy and I am led to wonder if the attorney comes in to help to present his views without response or merely if it is to be one more costly endeavor like CAA and CAB decisions take so long. If they would allow the law to be used, it would be a great advantage. I will advise a lot later than it has at the last date.

I own stock in a number of other companies but none of them practices the way that American Adair does. Even so, that has not paid a dividend in your stock

its stockholders a very complete report of what happened at the meeting. Some of those who sold securities with the disclosure filing of one of the respondents. If what I saw at American's meeting is typical of the industry, there it is high time to get out that money and get down to earth. It is no wonder why stockholders are considered spectators.

WILLIAM H. MONTAG,  
210 Franklin Avenue  
Beverly Hills, N. Y.

### Asks Suppliers' News

I have read with interest *Aviation Week* since its first issue. . . . I was on the staff of "Aviation" during 1957 and 1958 and considered it "Aviation" for many years afterward. I want to take this opportunity to congratulate you on the excellent job you have done in keeping up a publication of this type. For some years I have felt the need for such a publication and at one time contemplated trying to organize one.

I wonder if you would mind if I make a suggestion. . . . I feel that the emphasis on the airplane in a military vehicle has been overestimated to the point where the present conception of the weapons is distorted by the background of the recent need of having a "thing" machine.

Taken the fact that it is an increasingly accepted but its ability to perform the tasks for which it was intended is the major problem. The ability to perform these tasks is dependent upon the equipment installed in the vehicle.

This equipment no longer is a group of "tools" driven but is a sophisticated, interrelated device and system involving many complete new systems, electronic data processing, etc., etc.

This point is increased emphasis on the airplane and the equipment carried in the airplane and that the reason I feel that there should be an increase in the amount of space in the trade publications given to the systems making up this equipment.

One line is one of many applying equipment. The primary one is applied, but the industry and most of the equipment have comparatively little about the problems of making and applying such equipment.

These accessory manufacturers are justified by their ability to operate effectively in certain parts of equipment and certain systems. This line is one of many applying equipment. The primary one is applied, but the industry and most of the equipment have comparatively little about the problems of making and applying such equipment.

These accessory manufacturers are justified by their ability to operate effectively in certain parts of equipment and certain systems. This line is one of many applying equipment. The primary one is applied, but the industry and most of the equipment have comparatively little about the problems of making and applying such equipment.

LEONARD M. MONTAG, President  
LMA, Inc.  
Grand Rapids, Mich.



# ZERO

reader



### flight instrument with a mind

The Sperry ZERO READER® is a new type of gyroscopic flight instrument. It combines attitude, altitude, heading and radio push information on a single readout element indicator which tells the pilot exactly how to move the flight controls of his airplane.

- Developed by Sperry with the encouragement and cooperation

of All-Weather Flying Division USAF and the Air Transport Association, the ZERO READER takes its place among other Sperry "Gems" — the Gyro-Horizon, Directional Gyro, Gyrocompass and Gyrocompass. Like these precision instruments it reflects in its performance the laboratory research and careful flight testing which have contributed to

marked advancements in instrument flying.

- The ZERO READER is another example of Sperry's pioneering in equipment to help make air travel increasingly independent of weather for it is the only manual system which approaches the performance of stabilized automatic flight control.

**SPERRY**  
Gyroscopic Instruments  
DIVISION OF THE SPERRY CORPORATION  
GREAT NECK, NEW YORK  
NEW YORK • CHICAGO • NEW ORLEANS  
LOS ANGELES • SAN FRANCISCO • DALLAS



# 1903

## Alcoa Aluminum took wing with the Wrights at Kittyhawk

People said it wouldn't fly, because it was heavier than air. But when the Wright brothers' famous "flying machine" skimmed over the dunes at Kittyhawk, N. C., nearly 47 years ago, aluminum helped it start the Age of Aviation. Aluminum from the Pittsburgh Reduction Company—which later became Alcoa—was used for the crankcase and waterjackets on the Wright plane. The precious pounds it saved helped make the first flight possible.

# 1950

## Alcoa pioneers again with Extruded Aluminum 'Copter Blades

Today another type of "flying machine"—the helicopter—is finding wide usefulness in air transportation. Besides numerous applications in engine and airframe, Alcoa Aluminum now is being used for rotor blades. Special high-strength extrusions, produced by Alcoa, give the new blades improved performance.

Whatever your requirements, look to Alcoa as your "Flight Metal Headquarters". ALUMINUM COMPANY OF AMERICA, 1800A Gulf Building, Pittsburgh 19, Pennsylvania.



Send for your free copy of "How to Use High-Strength Aluminum Alloy," a convenient engineering reference to guide your use of 75S.



# ALCOA



## ALUMINUM and MAGNESIUM

ALUMINUM INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT MOLD CASTINGS • FORGINGS  
IMPACT EXTRUSIONS • ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • FOIL • PIGMENTS • MAGNESIUM PRODUCTS